

Application No. 09/683,659
Amendment dated December 9, 2004
Reply to Office Action of September 17, 2004

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A high pressure, high temperature capsule for containing at least one material and a solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom; and
- c) a sealed end adjoining said at least one wall opposite said closed end[.];
- d) one of at least one coating and an inert liner disposed on an inner surface of said at least one wall, said closed end, and said sealed end; and
- e) a diffusion barrier disposed between said inner surface and one of said at least one coating and said inert liner.

wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

2. (Original) The capsule according to Claim 1, wherein said capsule is formed from a cold-weldable material.

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3. (Original) The capsule according to Claim 2, wherein said cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

4. (Original) The capsule according to Claim 1, wherein said deformable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, and combinations thereof.

5. (Canceled)

6. (Currently amended) The capsule according to Claim ~~5~~1, wherein said at least one coating is formed from a first material comprising at least one of nickel, rhodium, gold, silver, palladium, platinum, ruthenium, iridium, tantalum, tungsten, rhenium, $MC_xN_yO_z$, wherein M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and wherein x, y, and z are between 0 and 3; and combinations thereof, and wherein said first material is different from said deformable material.

7. (Currently amended) The capsule according to Claim ~~5~~1, wherein each of said at least one coating is between about 0.5 micron and about 250 microns in thickness.

8. (Canceled)

9. (Currently amended) The capsule according to Claim ~~8~~1, wherein said diffusion barrier has a thickness of between about 10 nm and about 100 microns.

10. (Currently amended) The capsule according to Claim ~~8~~1, wherein said diffusion barrier is formed from a second material comprising at least one of nickel, rhodium, platinum, palladium, iridium, ruthenium, rhenium, tungsten, molybdenum,

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niobium, silver, iridium, tantalum, $MC_xN_yO_z$, where M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said second material is different from said first material and said deformable material.

11. (Original) The capsule according to Claim 1, wherein said capsule further includes an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

12. (Original) The capsule according to Claim 11, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

13. (Original) The capsule according to Claim 11, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said inner capsule are under one of compressive and neutral stress during processing at high pressure and high temperature.

14. (Original) The capsule according to Claim 13, wherein said pressure medium comprises at least one of said solvent, water, ammonia, and carbon dioxide.

15. (Original) The capsule according to Claim 11, wherein said inner capsule is formed from a glass.

16. (Original) The capsule according to Claim 15, wherein said glass comprises at least one of fused quartz, fused silica, borosilicate glass, aluminosilicate

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glass, soda lime glass, soda barium glass, soda zinc glass, lead glass, potash soda lead glass, potash lead glass, or potash soda barium glass.

17. (Original) The capsule according to Claim 11, wherein said inner capsule has a thickness of between about 0.1 mm and about 10 mm.

18. (Canceled)

19. (Currently amended) The capsule according to Claim ~~18~~1, wherein said inert liner has a thickness of between about 10 microns and about 5 mm.

20. (Currently amended) The capsule according to Claim ~~18~~1, wherein said inert liner is formed from a first material comprising at least one of gold, platinum, rhodium, palladium, silver, iridium, ruthenium, osmium, tantalum, tungsten, rhenium, molybdenum, niobium, zirconium, yttrium, titanium, vanadium, chromium, silica, and combinations thereof, and wherein said first material is different from said deformable material.

21-23. (Canceled)

24. (Original) The capsule according to Claim 1, wherein each of said at least one wall, said closed end, and said sealed end has a thickness of between about 0.2 mm and about 10 mm.

25. (Canceled)

26. (Currently amended) The capsule according to Claim ~~25~~28, wherein said baffle has a fractional open area between about 0.5% and about 30%.

27. (Currently amended) The capsule according to Claim ~~25~~28, wherein said baffle is formed from a first material and comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel, nickel-based alloy, zirconium,

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niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, and combinations thereof.

28. (Currently amended) ~~The capsule according to Claim 25, further including~~
A high pressure, high temperature capsule for containing at least one material and a solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom; and
- c) a sealed end adjoining said at least one wall opposite said closed end,

wherein said chamber is divided into two regions by a baffle having at least one coating disposed thereon—said baffle, wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

29. (Original) The capsule according to Claim 28, wherein said at least one coating is formed from a second material comprising at least one of nickel, rhodium, gold, silver, palladium, platinum, ruthenium, iridium, tantalum, tungsten, rhenium, $MC_xN_yO_z$, where M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said second material is different from said first material.

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30. (Original) The capsule according to Claim 1, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

31. (Original) The capsule according to Claim 30, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

32. (Canceled)

33. (Currently amended) The capsule according to Claim 32, A high pressure, high temperature capsule for containing at least one material and a solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom;
- c) a sealed end adjoining said at least one wall opposite said closed end; and
- d) an outer seal joined to said sealed end of said capsule, wherein said outer seal surrounds said capsule in its entirety, wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

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34. (Currently amended) The capsule according to Claim ~~32~~33, wherein said outer seal is formed from at least one of copper, copper alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, nickel, nickel alloy, iron, steel, iron alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, and combinations thereof.

35. (Original) The capsule according to Claim 1, wherein said capsule is impermeable to at least one of hydrogen, oxygen, and nitrogen.

36. (Original) The capsule according to Claim 1, wherein said capsule is self-pressurizing.

37. (Original) The capsule according to Claim 36, wherein said capsule is self-pressurizing from about 1 bar up to about 80 kbar.

38. (Original) The capsule according to Claim 37, wherein said capsule is self-pressurizing up to between about 5 kbar and about 80 kbar.

39. (Original) The capsule according to Claim 38, wherein said capsule is self-pressurizing up to between about 5 kbar and about 60 kbar.

40. (Currently amended) A plug for sealing a high pressure, high temperature capsule for containing at least one material and a solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule having at least one wall, a closed end, and a sealed end defining a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, said plug comprising a cold-weldable material and being sealingly insertable in an open end of said capsule, wherein said sealed end is formed by inserting said plug in said open end and cold welding said plug to said capsule, and at least one coating disposed on an inner surface of said plug.

41. (Original) The plug according to Claim 40, wherein said cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium,

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platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

42. (Canceled)

43. (Original) The plug according to Claim 40, wherein said at least one coating is formed from a first material and comprises at least one of nickel, rhodium, gold, silver, palladium, platinum, ruthenium, iridium, tantalum, tungsten, rhenium, $MC_xN_yO_z$, wherein M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said first material is different from said cold-weldable material.

44. (Original) The plug according to Claim 40, further including a fill tube joined to said plug, wherein said fill tube has an orifice that extends through said plug to an inner surface of said plug.

45. (Currently amended) A high pressure, high temperature capsule for containing at least one material and solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom; and
- c) a sealed end adjoining said at least one wall opposite said closed end, said sealed end comprising a plug that is cold-welded to said at least one wall[.];
- d) one of at least one coating and an inert liner disposed on an inner surface of said at least one wall, said closed end, and said sealed end; and
- e) a diffusion barrier disposed between said inner surface and one of said at least one coating and said inert liner.

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wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable cold-weldable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

46. (Original) The capsule according to Claim 45, wherein said deformable cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

47. (Canceled)

48. (Currently amended) The capsule according to Claim ~~47~~45, wherein said at least one coating is formed from a first material comprising at least one of nickel, rhodium, gold, silver, palladium, platinum, ruthenium, iridium, tantalum, tungsten, rhenium, $MC_xN_yO_z$, wherein M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said first material is different from said deformable cold-weldable material.

49. (Currently amended) The capsule according to Claim ~~47~~45, wherein each of said at least one coating is between about 0.5 micron and about 250 microns in thickness.

50. (Canceled)

51. (Currently amended) The capsule according to Claim ~~50~~45, wherein said diffusion barrier has a thickness of between about 10 nm and about 100 microns.

52. (Currently amended) The capsule according to Claim ~~50~~45, wherein said diffusion barrier is formed from a second material comprising at least one of nickel,

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rhodium, platinum, palladium, iridium, ruthenium, rhenium, tungsten, molybdenum, niobium, silver, iridium, tantalum, $MC_xN_yO_z$, where M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said second material is different from said first material and said deformable cold-weldable material.

53. (Original) The capsule according to Claim 45, wherein said capsule further includes: an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

54. (Original) The capsule according to Claim 53, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

55. (Original) The capsule according to Claim 53, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said inner capsule are under one of compressive stress and neutral stress during processing at high pressure and high temperature.

56. (Original) The capsule according to Claim 55, wherein said pressure medium comprises at least one of the solvent contained within the inner capsule, water, ammonia, or carbon dioxide.

57. (Original) The capsule according to Claim 53, wherein said inner capsule is formed from a glass.

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58. (Original) The capsule according to Claim 57, wherein said glass comprises at least one of fused quartz, fused silica, borosilicate glass, aluminosilicate glass, soda lime glass, soda barium glass, soda zinc glass, lead glass, potash soda lead glass, potash lead glass, and potash soda barium glass.

59. (Original) The capsule according to Claim 53, wherein said inner capsule has a thickness of between about 0.1 mm and about 10 mm.

60. (Canceled)

61. (Currently amended) The capsule according to Claim ~~6045~~, wherein said inert liner has a thickness of between about 10 microns and about 5 mm.

62. (Currently amended) The capsule according to Claim ~~6045~~, wherein said inert liner is formed from a first material comprising at least one of gold, platinum, rhodium, palladium, silver, iridium, ruthenium, osmium, tantalum, tungsten, rhenium, molybdenum, niobium, zirconium, yttrium, titanium, vanadium, chromium, silica, and combinations thereof, wherein said first material is different from said deformable cold-weldable material.

63-65. (Canceled)

66. (Original) The capsule according to Claim 45, wherein said at least one wall, said closed end, and said sealed end each have a thickness of between about 0.2 mm and about 10 mm.

67. (Canceled)

68. (Currently amended) The capsule according to Claim ~~6770~~, wherein said baffle has a fractional open area between about 0.5% and about 30%.

69. (Currently amended) The capsule according to Claim ~~6770~~, wherein said baffle is formed from a first material comprising at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium,

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vanadium, chromium, iron, iron-based alloy, nickel, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, and combinations thereof.

70. (Currently amended) ~~The capsule according to Claim 67, further including~~
A high pressure, high temperature capsule for containing at least one material and solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom; and
- c) a sealed end adjoining said at least one wall opposite said closed end, said sealed end comprising a plug that is cold-welded to said at least one wall wherein said chamber is divided into two regions by a baffle having at least one coating disposed on said baffle thereon, wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable cold-weldable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

71. (Currently amended) The capsule according to Claim ~~67~~70, wherein said at least one coating is formed from a second material comprising at least one of nickel, rhodium, gold, silver, palladium, platinum, ruthenium, iridium, tantalum, tungsten, rhenium, $MC_xN_yO_z$, where M is at least one metal selected from aluminum, boron, silicon, titanium, vanadium, chromium, yttrium, zirconium, lanthanum, a rare earth metal, hafnium, tantalum, tungsten, and x, y, and z are between 0 and 3; and combinations thereof, and wherein said second material is different from said first material.

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72. (Original) The capsule according to Claim 45, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

73. (Original) The capsule according to Claim 72, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

74. (Canceled)

75. (Currently amended) ~~The capsule according to Claim 74,~~ A high pressure, high temperature capsule for containing at least one material and solvent that becomes a supercritical fluid in a substantially air-free environment, said capsule comprising:

- a) a closed end;
- b) at least one wall adjoining said closed end and extending therefrom; and
- c) a sealed end adjoining said at least one wall opposite said closed end, said sealed end comprising a plug that is cold-welded to said at least one wall, and
- d) an outer seal joined to said sealed end of said capsule, wherein said outer seal surrounds said capsule in its entirety, wherein said at least one wall, said closed end, and said sealed end define a chamber therein for containing said at least one material and said solvent, wherein said chamber is substantially free from air, wherein said capsule is formed from a deformable material, and wherein said capsule is fluid impermeable and chemically inert with respect to said at least one material and said supercritical fluid.

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76. (Currently amended) The capsule according to Claim ~~74~~75, wherein said outer seal is formed from at least one of copper, copper alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, nickel, nickel alloy, steel, iron, iron alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, and combinations thereof.

77. (Original) The capsule according to Claim 45, wherein said capsule is self-pressurizing.

78. (Original) The capsule according to Claim 77, wherein said capsule is self-pressurizing from about 1 bar up to about 80 kbar.

79. (Original) The capsule according to Claim 78, wherein said capsule is self-pressurizing up to between about 5 kbar and about 80 kbar.

80. (Original) The capsule according to Claim 79, wherein said capsule is self-pressurizing up to between about 5 kbar and about 60 kbar.

81-94. (Canceled)

95. (New) The capsule according to Claim 28, wherein said capsule is formed from a cold-weldable material.

96. (New) The capsule according to Claim 95, wherein said cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

97. (New) The capsule according to Claim 28, wherein said deformable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, and combinations thereof.

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98. (New) The capsule according to Claim 28, wherein said capsule further includes an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

99. (New) The capsule according to Claim 98, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

100. (New) The capsule according to Claim 98, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said inner capsule are under one of compressive and neutral stress during processing at high pressure and high temperature.

101. (New) The capsule according to Claim 28, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

102. (New) The capsule according to Claim 101, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

103. (New) The capsule according to Claim 28, wherein said capsule is impermeable to at least one of hydrogen, oxygen, and nitrogen.

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104. (New) The capsule according to Claim 28, wherein said capsule is self-pressurizing.

105. (New) The capsule according to Claim 33, wherein said capsule is formed from a cold-weldable material.

106. (New) The capsule according to Claim 33, wherein said cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

107. (New) The capsule according to Claim 33, wherein said deformable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, and combinations thereof.

108. (New) The capsule according to Claim 33, wherein said capsule further includes an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

109. (New) The capsule according to Claim 108, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

110. (New) The capsule according to Claim 108, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said

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inner capsule are under one of compressive and neutral stress during processing at high pressure and high temperature.

111. (New) The capsule according to Claim 33, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

112. (New) The capsule according to Claim 111, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

113. (New) The capsule according to Claim 33, wherein said capsule is impermeable to at least one of hydrogen, oxygen, and nitrogen.

114. (New) The capsule according to Claim 33, wherein said capsule is self-pressurizing.

115. (New) The capsule according to Claim 70, wherein said deformable cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

116. (New) The capsule according to Claim 70, wherein said capsule further includes: an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

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117. (New) The capsule according to Claim 116, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

118. (New) The capsule according to Claim 116, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said inner capsule are under one of compressive stress and neutral stress during processing at high pressure and high temperature.

119. (New) The capsule according to Claim 70, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

120. (New) The capsule according to Claim 119, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

121. (New) The capsule according to Claim 70, wherein said capsule is self-pressurizing.

122. (New) The capsule according to Claim 75, wherein said deformable cold-weldable material comprises at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, iron, iron-based alloy, nickel, nickel-based alloy, and combinations thereof.

123. (New) The capsule according to Claim 75, wherein said capsule further includes: an outer capsule and an inner capsule nestingly disposed within said outer capsule and in a spaced apart relation to said outer capsule such that a free space exists

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between said outer capsule and said inner capsule, wherein each of said outer capsule and said inner capsule has at least one wall, a closed end, and a sealed end defining a chamber therein, and wherein said chamber of said inner capsule is adapted to contain said at least one material and said solvent.

124. (New) The capsule according to Claim 123, further including a pressure medium disposed in said free space, wherein said pressure medium equalizes a pressure within said inner capsule.

125. (New) The capsule according to Claim 123, further including a pressure medium disposed in said free space, wherein the pressure medium provides an overpressure so that said at least one wall, said closed end, and said sealed end of said inner capsule are under one of compressive stress and neutral stress during processing at high pressure and high temperature.

126. (New) The capsule according to Claim 75, wherein said sealed end comprises a lid having a sealed fill tube, wherein said lid is sealed to said at least one wall by one of a pipe thread seal, a metal-to-metal compression seal, a gasket seal, and a weld seal.

127. (New) The capsule according to Claim 119, wherein said lid and said fill tube comprise at least one of copper, copper-based alloy, gold, silver, palladium, platinum, iridium, ruthenium, rhodium, osmium, titanium, vanadium, chromium, iron, iron-based alloy, nickel-based alloy, zirconium, niobium, molybdenum, tantalum, tungsten, rhenium, silica, alumina, or combinations thereof.

128. (New) The capsule according to Claim 75, wherein said capsule is self-pressurizing.